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Visual Media Influence on Behavior

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Abstract

This project involves basic research into the cognitive mechanisms underlying culture transmission. Its focus is on visual media, using film clips featuring two males in a hierarchical relationship. The research asks what determines those to whom we attend and from whom we learn. Data collected include the use of an eye-tracker to measure visual attention, a questionnaire to examine attitudes and perceptions of the characters presented in the video clips and a recall task to assess task effort.

Since the last interim report, data collection has concluded, although data analysis is ongoing from the most recent study. Two articles have already appeared (Barkow, O'Gorman, and Rendell 2012, 2013) and a book chapter is forthcoming (Barkow i.p). An additional article is near submission (Boothroyd, O'Gorman, Kentridge, and Barkow n.d.), while a further article is expected from the final data. Funding for this project concluded 12 October 2013.

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Summary

This project involves basic research into the cognitive mechanisms underlying culture transmission. By “culture” is meant a pool of shared information; to say that that information is “transmitted,” however, is to use a vague label for the end result of an unknown number of cognitive processes loosely involving social learning and which range from language acquisition to moral development. Each of these processes is likely to operate differently at different ages, may or may not differ across gender, may or may not be affected by social environment (including “ethnicity” and also including the actions of others), likely has an age-related developmental trajectory, and serves functions at the level of individual psychology; their operation across many individuals results in an apparent “transmission” of culture. This project focuses on how we may acquire/edit information from those with whom we form brief social relationships.

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To acquire information from others we must first attend to them: one of the project’s broad research questions involves what makes us pay attention to others, that is, what are the *attention attractors*. But we do not simply receive information from those to whom we attend, we edit information, selectively acquiring some, disregarding some, and altering some. The process of *cultural editing* at the individual level has to do with how we develop both practical knowledge and personal values and goals, while at the collective level the pooled, cumulative effect of our editings determines the continuity and change of culture itself. Many of the relationships through which we acquire cultural information, today, are parasocial, that is, one-way relationships. It is assumed here that these *parasocial* relationships are essentially similar to those we form with corporeal figures, utilizing the same cognitive mechanisms. The relationships we form with figures in films are therefore useful models for how and what we learn from others in general. The experimental design of this project uses clips from older, commercially successful films. The clips feature two males in a hierarchical relationship and the research asks in part what determines to whom we attend and learn from. A key hypothesis is that we learn preferentially from the high in status: status is an attention attractor. An eye-tracker records the amount of attention paid to each figure, while a recall question permits determination of how much has been learned about the figures and the content of that learning. A questionnaire provides independent variables including the characteristics of the viewer (e.g., gender, age, ethnicity, level of self-esteem) and the viewer’s perception of each figure (including relative standing, dangerousness, likeability, attractiveness, and similarity to self).

374 postgraduate and undergraduate students recruited from Durham and Essex University have taken part in the research. For Study 1a, 58 Caucasian participants were assigned randomly into the experimental (viewed video footage of actors in dominance scenarios) or control (no video) conditions, with visual attention tracked for presentation of stimuli. For Study 1b, 63 East Asian participants underwent the same procedure. For Study 2a all of its 253 participants viewed the video footage and completed a questionnaire assessing attitudes toward the video clips, characters within the clips and evaluations of the dynamics between the

clip protagonists. In study 2b, we ran an additional 80 participants, split (roughly) between British participants and Asian (Chinese) participants and with approximately equal numbers of females and males. Study 2b replicated the procedure of studies 1a/1b. This will allow for comparison of the video effect (i.e., different clips from two different films), sex, and cultural differences. There have been no changes to the procedure as originally approved. The full analysis of the data collected in the course of this project will be found in Boothroyd et al (n.d., in preparation) and the follow-up manuscript, as discussed above.

This project is relevant to the mission of the USAF because mass media and modern ease of travel have apparently disrupted the operation of cognitive mechanisms involved in culture transmission. As a result, sharp cultural discontinuities are now possible not only between neighbors but even between parents and children. Opportunistic networks are apparently taking advantage of this disruption by providing both virtual and physically present figures who in effect cognitively replace the ordinarily respected local personalities. Because human beings apparently learn preferentially from the high in status – a key hypothesis of this project -- young people can be recruited to networks espousing violence and other values conducive to political instability. But insofar as these conclusions pertain to cognitive mechanisms they may be premature because fundamental research into culture transmission was long neglected. This project contributes to that fundamental research.

Introduction²

This project involves basic research into some of the cognitive mechanisms underlying culture transmission. Its focus is on the role of visual media and the social relationships they engender, and on the acquisition/editing of cultural information.

When we hear the word “culture,” today, we almost expect it to be followed by the word, “change.” But rapid and unpredictable sociocultural change was not always the norm. Once, parents could take for granted that their children would want to be like them, or at least like some member of their community. Today, a youth in Central Asia or southern Africa may be paying more attention to Lady Gaga, Eminem, or Osama bin Laden than to the adults around them. Mass media, visual media in particular, some would argue, have broken the chain of cultural transmission and replaced it with cultural confusion. What is actually happening and how might we understand such a complex state of affairs? While we enjoy an abundance of critiques and interpretations of film and television, the scientific study of visual media and cultural transmission, and their underlying cognitive mechanisms, is in its infancy.

Culture transmission permeates our lives: We learn from and teach one another, we imitate, we model, our choices are influenced by what others choose, we debunk and praise and invent. The authoring and *editing* of culture is continuous. For psychologists and other researchers, culture has often been the forest made invisible by the myriad events and processes that

² Much of this material has now appeared in Barkow, O’Gorman and Rendell (2012, 2013).

generate it.³ For social scientists, until recently the stability of cultural transmission was “explained” by vague processes of “socialization” or “enculturation”; it was only cultural and social *change* that needed to be explained, most often in terms of the impact of new technologies (e.g., Ogburn, 1964; Schaniell, 1988). We understand now, though, that any meaningful theory of culture change needs to account for both change and stability (Barkow, 1989) and to encompass individual level cognitive as well as sociocultural processes. Schools of thought with regard to culture transmission and change include transmission theorists who build mathematical models of culture change (e.g., Boyd & Richerson, 1985); the epidemiology of representations approach associated with Dan Sperber (1996) and his collaborators; and the perspective from evolutionary psychology pioneered by Cosmides & Tooby (1989).

What research can help us to understand the role of visual media, in particular, in culture transmission? How do we go about transforming the seemingly chaotic impact of visual media into probabilistic predictions about their behavioral effects on specific demographic groups? *Attention* is the point of entry. Information enters the brain when we pay attention. The attentional channels of our ancestors originally had to do with mate selection, dominance, threat, danger, care of offspring, and resources such as food. These channels have broadened, in our species, to permit transmission of highly learnable, highly motivational cultural information.⁴

For most of our history as a species this *cultural editing* met two survival requirements: 1) our survival and reproduction as individuals, and 2) the survival and continuity of our cultural groups. As individuals, we learned from others what we needed to know to survive in our local environment. Which others? As Michael Chance (1967; Chance, 1967; Chance & Larsen, 1976) argued long ago, primate social hierarchies are attention hierarchies: we pay preferential attention to the high in status. In human societies, these are the successful, the most respected.⁵ We learn from the woman whose babies are more likely to be healthy and to survive than other women’s children. We learn preferentially from the farmers whose crops are bountiful, from the crafters whose products are useful and durable, from the hunters who bring back the game, and from the leaders who maintain community harmony, win battles and negotiate peace. We tend to ignore the “losers,” that is, the low in status. This selective attention increased the odds that we ourselves would be at least as successful as our information sources. Because we all did this, the cumulative effect at the collective level was to edit our local knowledge pools, our cultures. We edited out knowledge that no longer worked in our changing social and environmental conditions while adding knowledge that did work. Of

³ But see, for example, Barkow, 1989, 2006; Boyd & Richerson, 1985, 2005; Boyer, 2001; Dunbar & Knight, 1999; Laland, 2002; Rendell et al., 2010, 2011; Richerson & Boyd, 2005; and Sperber, 1996.

⁴ Researchers have tested attention attraction hypotheses derived from evolutionary psychology and from theories of social cognition but have not examined the issue of whether these attentional channels served as *exaptations* for cultural transmission, that is, whether they were co-opted by selection for cultural capacity. See, for example, Cheng et al. 2013; DeWall & Maner, 2008; DeWall, Maner, & Rouby, 2009; Kenrick, Neuberg, Griskevicius, Becker, & Schaller, 2010; Maner, DeWall, & Gailliot, 2008; Maner, Gailhot, & DeWall, 2007; Maner, et al., 2003.

⁵ Chimpanzees, too, apparently learn preferentially from the high-in-status. See Horner, Proctor, Bonnie, Whiten, & de Waal, 2010.

course, we learned from others, too – social standing was not the only attention attractor and it is likely that it is both the situation and the nature of the information involved that affects what we learn: mention “danger” and we humans pay attention almost regardless of who is speaking, for example. But the research and theory which are the subjects of this interim report is largely (though not exclusively) focused on preferential learning from the high in status. (See, however, the discussion in the “Conclusions” section of the broader proposal for future research recently submitted by this project’s investigators.)

Cultural editing has always been a very rough process: Errors such as assuming the tomato is as deadly as its nightshade relative, or that the infant must not be given the, in fact, healthful colostrum (the pre-milk secretion of the breast) have been common both historically and cross-culturally (Barkow, 1989). Even more common is culturally transmitted noise; that is, information that even though associated with prestigious individuals is probably adaptively neutral. The details of creation myths or hairstyles or hats are likely to be in this category. As with Jane Goodall’s (1988) chimpanzee Mike, who gained status via the attention drawn by banging empty kerosene cans together, prestigious individuals need not actually accomplish anything except getting the attention of others, contributing nothing but non-adaptive noise to the cultural information pool. However imperfect culture editing may have been in the past, today it can appear to be random chaos. Modern media devalue the coin of local prestige so that we attend to and learn not only from our own parents or other family members, not only from the local dignitaries of our communities, the local successes, but from distant strangers. Confusion about who and what is prestigious can leave young people vulnerable to recruiters who use social media to capture attention, presenting their own religion or ideology-based strategies for gaining prestige and recognition, deliberately transmitting beliefs and values that, in some cases, involve incitement to commit terrible violence. Even for those not so confused, the most powerful attention-attracting figures in contemporary society are celebrities, and most celebrities (other than athletes) are professional entertainers. It is not just that celebrities are non-local, not just that they distract our attention from realistic and socially valuable local strategies for accomplishment, it is also that celebrities are often in whole or at least in part fictitious. The public images of these personalities tend to be crafted by professional publicists. Lady Gaga and Paris Hilton, it could be argued, are calculated creations, human “Mikes” with electronically amplified, designer kerosene cans. The public images of politicians and sports figures are similarly spun by experts in public relations. Celebrities need only be psychologically authentic to their audience, and for some of us the various incarnations of James Bond or Captain Kirk are real enough to capture our attention. As our younger generations learn preferentially from these non-local and often entirely or partially fictional but always attention-attracting figures, parents may find their children’s behavior incomprehensible. The celebrities who capture young people’s attention and from whom they learn tend to replace individuals who actually have locally relevant information: parental and community values and goals and the strategies for attaining them may not be transmitted. For lack of locally relevant cultural information, individuals may attempt to reach default goals of wealth and prestige through crime (or, slightly less alarmingly, by forming their own rock bands or by becoming rappers). Young people can readily recite the romances and rehabs of celebrities but may not know what the neighbors do for a living.

The ideas presented above are in part products of two EOARD-sponsored workshops designed to generate fundamental scientific research. The 2008 “Social Disorganization and Human Evolution: Media Disruption of Social Transmission” workshop was organized by Barkow and held at Queen’s University Belfast, while the follow-up 2009 “Social Disorganization and Social Transmission: Progress and Plans” took place at St. Andrew’s University in Scotland and was organized by Luke Rendell of that university with Barkow’s collaboration. In addition to the project with which this ifinal report deals, the workshops led to a second project, headed by Rendell. Though both projects have much in common in terms of underlying theory, the Rendell project focused on “the conditions under which people are more likely to turn to social information rather than their own existing knowledge or beliefs”(from Rendell’s EOARD application). The current project, in contrast, focuses on how social relationships (albeit brief ones) can result in social/cultural information acquisition/editing.

The general theory of culture acquisition/editing underpinning this project is quite expansive; however, the current research was deliberately designed as a relatively modest empirical study with two main goals: First, to develop a methodology for the study of visual media and cultural information acquisition/editing; and, second, to explore empirically a number of hypotheses that deal with when we attend to and what we learn from the characters we encounter in film. One of these hypotheses is that we pay preferential attention to and learn preferentially from the high-in-status. The detailed research procedures are to be found below, under the heading “Methods.” Very briefly, however, research participants are shown film clips that present two males in a hierarchical relationship. An eye-tracker tests the preferential attention part of the hypothesis while a recall task determines whether the participant has learned more from and about the higher than the lower status figure. A questionnaire with rating scales collects the data pertinent to the question of whether personal characteristics of the participant, as well as the participant’s perception of the media figure, affect what and how much has been learned.

Relevance to the mission of the USAF. This basic research is relevant to the mission of the USAF because mass media and modern ease of travel have apparently disrupted the operation of the cognitive mechanisms involved in culture transmission/editing. As a result, sharp cultural discontinuities are now possible not only between neighbors but even between parents and children. Opportunistic networks are likely taking advantage of this disruption by providing both virtual and physically present figures who in effect cognitively replace the ordinarily respected local personalities. Because human beings learn preferentially from those whom they perceive to be high in status, young people can be recruited to networks espousing violence and other values conducive to political instability. But these conclusions are premature because basic research into culture transmission was long neglected, research to which this project is designed to contribute.

Methods, Assumptions and Procedures

Our research methods incorporate the following assumptions:

- 1) We form parasocial (one-way) relationships with media figures (cf. Kanazawa, 2002).
- 2) When we view interaction among individuals of unequal status, we pay preferential attention to the one we perceive as being of highest rank or status.
- 3) We form parasocial or one-way relationships with figures in films, and these relationships invoke the same cognitive mechanisms that are involved when we personally interact with actual, physically present, people.
- 4) Parasocial relationships are comparable to ordinary human social relationships in that they also can serve as a conduit for the social learning essential for the transmission of the information of which cultures are composed.
- 5) Gaze duration is a valid direct measure of attention.

Our methods and procedures:

Data collection was completed in two locations, the University of Durham campus and the University of Essex campus. There were two study procedures, one involving eye-tracking and one not. The eye-tracking studies consisted of participants viewing two video clips (discussed below) and then presented with a series of stills from the clips. Visual attention was tracked to capture differential levels of attention for the competing protagonists in the clips. Participants then completed an extensive questionnaire assessing attitudes toward the clips, evaluations of feelings and moods generated by the video clips, and emotional responses to the clip protagonists.

The first round of data collection took place during the Spring and Summer of 2010. Eyetracking and questionnaire data were collected for the first 34 research participants with the aid of Boothroyd's psychology departmental colleague, Dr. Bob Kentridge, an expert in the use of eye-trackers. (Boothroyd herself was on a one-year maternity leave that ended May 2011.)

A second round of data collection began in May 2011. It is in all respects identical to the first round except that: 1) no eye-tracker data are currently being collected due to the unavailability of the research assistant who had previously helped to collect the data and to the illness of Dr. Bob Kentridge. 2) Rather than having a research assistant show the video clips and then sit participants down one-by-one at a computer in order to administer the questionnaire, the video clips have been incorporated into an online questionnaire. To achieve this, specialist video-editing software (Emicsoft Media Converter) was purchased to convert the video clips into a version compatible with the tool being used for the questionnaire (Surveygizmo). (Participants remain limited to local university students, please note that this is an online but not an internet study.) The sample continues to be opportunistic. Round 2 has had 253 participants completing the questionnaire. A third round was conducted at Durham recruiting East Asian participants, while a final round of data collection was conducted at Essex, recruiting both Caucasian and East Asian participants. These latter rounds used the eye-tracking procedure.

Experimental group: men and women aged 20-25 were recruited through an opportunity (word-of-mouth) sample of university students. These participants watched the film clips and then completed the eye-tracking task, the face perception task, the control variables questionnaire, and the character recall task in that order.

Film clips. Two clips were utilised, drawn from pre-1970 films. In each clip, two men were involved in a hierarchical dyadic interaction. It was possible to identify a clear 'alpha' male in each scene. In the first clip, from 'The Good, the Bad, and the Ugly', the 'alpha' male enters the room and eats the 'beta' male's food uninvited and without asking. In the second clip, from 'Shot in the Dark,' the 'alpha' male is the superior of the 'beta' in the police force and is being reported to. Clips were approximately 30 seconds in length and were edited to ensure that key character names were not mentioned so as to increase the likelihood that participants would remain naïve to the broader nature of the films.

Eye-tracking. The first dependant variable was the differential attention paid to the two characters. A desk-mounted eye-tracker was utilised.

Stimuli: Participants were shown stills taken from the clips in order to determine which characters drew their attention. For Clip 1, it was not possible to use a screen shot including both characters, so two stimuli were created in which stills of the two characters were presented side by side (balanced for left-right position). For Clip 2, two stills including both males on the same level were taken. The stimuli were interspersed with distractors consisting of pairs of facial masculinity stimuli drawn from previous research (Perrett, et al, 1998).

Procedure and data recorded: For each stimulus, areas of interest were defined as the rectangles surrounding each character's head and body. Stimuli were presented in random order for 5 seconds, and returned to a fixation point thereafter. Participants advanced to the next stimulus by pressing the space bar when they were ready. We recorded: i. Location of first fixation (alpha, beta, other); ii. Proportion of fixations to alpha vs beta male in first 2 seconds; iii. Proportion of fixations to alpha vs beta male across whole exposure; and iv. Mean pupil dilation for alpha vs beta male fixations.

Face perception task. The second dependant variable was the degree to which participants had internalised the hierarchical positions of the two males in each clip.

Stimuli: Participants viewed stills of the characters' faces and also two stills of each actors' face when not in character in order to ascertain whether the attributions were being made to the accoutrements of the characters or the expressions. The stimuli were interspersed with distractors consisting of masculinity stimuli drawn from previous research (different stimuli from those in the eye-tracking task, also drawn from Perrett et al, 1998).

Test 1: The participants first rated each face for social dominance, leadership, status and attractiveness on 1-7 Likert scales. All faces were rated for a given trait, and then all faces for the next and so on, in four blocks of trials.



Figure 1 Lower status figure from *The Good, the Bad, and the Ugly*

Test 2: They then compared the two actors/characters for the same traits in pairs of faces. For the paired-face test they were asked to indicate which face they found more attractive/dominant/higher status/more a leader and then how much more so in 4 degrees from 'guess' to 'very much'. This produced an 8 point scale from 0 (beta male more attractive/dominant etc) to 7 (alpha male much more attractive/dominant etc) where 3.5 indicated no preference either way. For the paired trials, actors' ages at time of photograph were matched as closely as possible and were matched for colour/black and white. Order of faces/pairs within blocks of trials was randomised.

Character perception and recall. The final dependant variables included items that yield a measure of self-esteem. Participants were also asked to rate (using a 7-point Likert scale) the extent to which the situation presented involved danger or threat. With reference to each character in each clip, participants were asked to rate the extent to which they saw themselves as similar to the figure, the extent to which the figure desired to dominate the situation, and the extent to which the figure was imposing, weak, likeable, unpleasant, friendly, admirable, solitary, odious, sexually attractive, dominant, submissive, violent, and peaceful. Participants were then requested to "Please describe in detail what took place in the clip you just viewed – what happened, anything you remember, including what the figures did and said, where they were and how they were dressed. Try to provide as much detail as possible."

Control variables. The questionnaire asks for information about age, gender, place of birth, nationality, ethnicity, religion, and socioeconomic status.

Results and Discussion

In analyses so far, we have found that observation of a hierarchical interaction biases attention (as measured by eye-tracking) but in a complex manner, with differences due to sex and the type of interaction. Women directed more attention toward the dominant individual when that individual was seen interacting in a hedonic form with a subordinate. This reverses for men; men directed less attention to the dominant character after seeing a hedonic interaction. For agonistic interaction, men directed more attention to the dominant character when having seen the interaction. This was supported by dominance ratings, with the dominant character in the agonistic interaction rated as relatively more dominant (versus the subordinate) than the dominant in the hedonistic interaction. In the absence of watching the interactions, the characters were not rated as significantly different in dominance, showing that information in

the interaction was critical to this assessment. Again, this carries over to written recall provided by participant. Analysis of words spent on each character found that the dominant character for the agonistic interaction received significantly higher levels of words than the subordinate, whereas this reverses for the hedonic interaction (possibly driven by the hedonic interaction having substantially greater dialogue, particularly by the subordinate, thus providing more to report about the subordinate).

One basic methodological question was whether participants were reacting simply to the still photos rather than to the clips. Preliminary analysis shows that questionnaire results for participants who had seen the photos but not the clips are in the same direction but much smaller than the results for those who had seen the clips. Those, it is apparent that the participants are indeed being affected by the clips. (Presumably, they are forming the parasocial or “one-way” relationships we expected them to form.)

To summarize, we found that observation of a hierarchical interaction biases attention (as measured by eye-tracking) but in a complex manner, with differences due to sex and the type of interaction. Women directed more attention toward the dominant individual when that individual was seen interacting in a hedonic form with a subordinate. This reverses for men; men directed less attention to the dominant character after seeing a hedonic interaction. For an agonistic interaction, men directed more attention to the dominant character when having seen the interaction. This was supported by dominance ratings, with the dominant character in the agonistic interaction rated as relatively more dominant (versus the subordinate) than the dominant in the hedonistic interaction. In the absence of watching the interactions, the characters were not rated as significantly different in dominance, showing that information in the interaction was critical to this assessment. Again this carries over to written recall provided by participant. Analysis of words spent on each character found that the dominant character for the agonistic interaction received significantly higher levels of words than the subordinate, whereas this reverses for the hedonic interaction (possibly driven by the hedonic interaction having substantially greater dialogue, particularly by the subordinate, thus providing more to report about the subordinate).

Conclusions

The following discussion focuses upon the analysis for the first study's data, while elaborating in the context of the project goals as a whole.

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It is apparent that this project's basic set of experimental methods are sound. Greater eye-tracker attention is apparently being paid to the higher rather than to the lower status individual, for both film clips. The results for those participants who have seen only the still photos but not clips are generally in the same direction but much weaker than they are for those who have seen both

The aim of the studies was to investigate whether observation of a hierarchical interaction between two males resulted in subsequent biases in visual attention, recall and perception of dominance of the interactants. While there was a simple effect of watching the interaction on later perceptions of those individuals' general social dominance, such that information about rank was retained, effects for the other measures were more complex. For our first clip, drawn from *The Good, the Bad and the Ugly*, viewing the interaction resulted in a bias towards attending to the dominant male in male observers, and there was higher recall of the dominant male for both sexes. For our second clip, however, drawn from *Shot in the Dark*, viewing the interaction increased attentional bias to the dominant male in female observers, but may have decreased it in male observers. Furthermore, there was greater recall of the subordinate rather than dominant character.

The difference between the results of these two clips may be a reflection of the nature of the hierarchical interactions depicted. While Clip 1 displayed an antagonistic and fear-inspiring interaction (indeed, the subordinate character is killed by the dominant character just after the clip ends), and the dominant character displayed what we might consider evolutionarily ancient dominance behavior by taking the subordinate character's food uninvited and unchallenged (preferential food access being a key marker of dominance in non-human primates), Clip 2 involves low levels of physical threat and a comparatively cordial interaction. In other words, Clip 1 involves what could be considered achieved or personal status while Clip 2 involves *conferred* status, that is, status reflecting formal social position. It is therefore perhaps less surprising that men in particular become more attentive to the dominant male in Clip 1 (who potentially represents a direct threat) after witnessing such an interaction, and also why observers may be more likely to recall information about him several minutes later.

These data thus build on Maner et al's (2008) results by suggesting that agonistic dominance may be necessary to engender a later attentional bias as opposed to immediate attention, in male observers at least. (Although it should be noted that our characters were matched within each clip for type of clothes and dominance had to be inferred from behavior).

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List of Symbols, Abbreviations, and Acronyms

QUB = Queen’s University Belfast